**Digital Product Assignment**

**TEACHER APPRENTICE:** Jenny Yeo

**SUBJECT:** Algebra I (Linear Functions)

**OBJECTIVES**

* Common Core Standard:

*Define, evaluate, and compare functions.* 8.F.1. “Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.”

*Use functions to model relationships between quantities.* 8.F.4. “Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.” 8.F.5. “Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.”

**Student Learning Outcomes**

* Students will understand conceptually and will demonstrate the ability 1) to graph linear functions by plotting points, 2) to determine y-intercepts and slope, 3) to write the equation of a linear function given the slope and a point on the line, 4) to analyze how the graph changes after changing slope values or coefficients and to compare with the first graph, 5) to model linear functions and use corresponding calculators to understand how linear modeling works in the real world

**Rationale for Lesson**

* The concept of a function is one of the most important ideas in higher mathematics. The idea of a function can be used to describe a special type of relationship between one variable and another. The understanding of what linear function means conceptually and how to describe a function using a graph, a table, or words are important for students’ success in this mathematics course, as well as in their future mathematics courses. For example, students will need a deep understanding of a linear function in order to develop an understanding of graphing different types of functions such as exponential functions or logarithms and, later on, to develop an understanding of rate of change in calculus. In addition, if students understand a linear function well, then they can use it in everyday life. For example, a person can study a relationship between the number of minutes used and the cost on a cell phone bill. Analyzing functional graphs will be helpful for other subjects such as economics, statistics, accounting, and soon.

**Pre-requisite Skills for Students in Content**

* Students should know the meanings of independent and dependent variables.
* Students should know the meanings of domain and range of the function.
* Students should understand the meaning of slope and be able to get it.
* Students should know what x-intercept and y-intercept are and be able to graph coordinates on a coordinate plane.

**Pre-requisite Skills for Students in Technology**

* Students need to be familiar with using a graphing calculator.
* Students have an ability to send and receive e-mail to ask questions.

**How This Lesson Aligns with the 21th Century Framework**

* This lesson is based on a real-world problem, so students can apply a linear function to a real situation. Also, students can make graphs using given data and analyze them in a variety of fields such as economics, accounting, statistics, and so on. By assigning some more real-world problems, students will improve not only problem-solving skills but creativity.
* Instead of teaching one-sidedly, a teacher leads a deep conversation about the task in order to help students develop a deep understanding of the concept of a linear function.
* In this lesson, students will use a graphing calculator to apply real world applications. Since data is not always given as whole numbers, students will need technology for further understanding. In addition, it is effective for students to understand conceptually when they input different slope values or coefficients to see how the graphs change.

**Materials Needed**

* Squared sheets, pencils, color pencils, erasers, a graphing calculator.